Carrot Improvement for Organic Agriculture

with Added Grower and Consumer Value

GOALS

The **Carrot Improvement for Organic Agriculture (CIOA)** project is developing carrot cultivars for organic farmers and creating high-quality organic carrots for consumers

WORK

ADAPT carrot cultivars to organic conditions with improved vigor, yield, nutrition, flavor, storability, and disease and pest resistance

DETERMINE how carrot genotypes interact with, or influence, the root microbiome

TEACH consumers about the positive environmental impacts of organic agriculture and carrot nutritional quality, flavor, and culinary attributes

INFORM farmers about CIOA cultivar performance

TRAIN agricultural students in issues critical to organics

PARTNERS

United States Department of Agriculture-Agricultural Research Service, University of Wisconsin-Madison, Organic Seed Alliance, Purdue University, University of California-Riverside, University of California Cooperative Extension, and Washington State University. This project is funded by the National Institute of Food and Agriculture (NIFA). Award #2016-51300-25721. Period of funding 9/1/2016-8/31/2020.

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DEVELOPING CULTIVARS

We are refining carrot populations for cultivar development with promising traits, including visual appeal, flavor, and agronomic potential. We plan to release two new, open-pollinated, novel-colored carrot cultivars to the commercial market – one that is a stunning, conical shaped, purple carrot with deep purple epidermis, purple to orange cortex, and an orange core; the other is a beautiful, cylindrical, red carrot with a bright red epidermis and cortex surrounding a red core. Both have been selected for flavor, vigorous top growth, and superior production in organic conditions.

We are also creating new breeding populations to serve as the foundation for novel-colored cultivars with improved visual appeal, flavor, and agronomic qualities, and for orange cultivars that combine flavor, high-beta carotene content, and nematode and disease resistance. A highly diverse carrot population with a "rainbow" of colors is being developed and shared with seed companies and participatory farmer-breeders. We are also screening the USDA collection of geographically- and genetically- diverse carrot germplasm for potential new breeding stocks targeted for organic systems.

PRIORITIZING FLAVOR

Flavor is a priority trait in our screening and breeding goals, and necessary for the success of new cultivars. We conduct a flavor analysis annually on all entries, with more extensive sensory analysis of culinary quality and visual appeal on select materials. Carrots with superior flavor, overall eating quality, and field performance, will be used for subsequent seed production to develop promising breeding lines.

Multivariate analysis is used to analyze the relationship among cultivars, using their entire flavor profile as evaluated by participating project chefs. Carrot cultivars are evaluated by chefs for sensory quality in an exercise known as "Projective Mapping" to rate flavor of advanced breeding selections.

ON-FARM TRIALLING

We are conducting on-farm trials with organic farmers and organic seed companies in six regions across the U.S. to assess cultivar performance under diverse environments, get farmer input to inform breeding efforts, and train farmers in on-farm cultivar evaluation and breeding methods. These sites also serve as a national testing network for evaluating cultivars that are ready for release. The results from these trials will inform future breeding.